THE TOTAL SOLAR ECLIPSE OF MAY 9, 1910.

IT was reported in last week's NATURE that, owing to very unfavourable weather conditions, the eclipse of the sun, visible from Tasmania, could not be observed at all. In spite of the fact that the weather conditions in that month were not considered to be very favourable, the parties that set out from England and Australia did not expect to have to contend with the very abnormal weather that they actually experienced. Indeed, the southern part of Australia has, according to recent mails, been suffering also from weather frolics, so that these exceptional conditions were not limited to the eclipse stations.

Those who have been out on eclipse expeditions can quite understand the amount of work involved in the erection and adjustment of several high-powered instruments. Under such conditions as "only two fine days in the last fortnight; terrific gales and thunder frequent," as Mr. Frank K. McClean reports from his station, an idea will be gathered of the difficulties under which he and his party had to labour.

Although the results of the eclipse are negative, it is nevertheless of interest to place on record the elaborate instrumental equipment which Mr. McClean took out with him to use. They consisted in the main of two spectrographs for obtaining photographs of the spectra of the chromosphere and corona, and three coronagraphs of different powers for securing records of the form of the corona. In connection with these instruments he took with him a large 21-inch siderostat and a 16-inch coelostat, to feed the above instruments with light from the eclipsed sun. In addition to these, he had several instruments of minor importance. With such a fine equipment and such willing helpers it is a pity that it was not possible to make an attack on the eclipsed sun.

It will be remembered that the eclipse track traversed the southern part of Tasmania. As the Australian party occupied Bruni Island, Mr. McClean, in order to obviate any local bad weather condition, set himself the task of selecting another site. This scattering of eclipse parties along the path of the moon's shadow on the earth is usually done when possible; but sometimes, as in this case, very considerable extra labour and difficulties are met with, as it necessitates the additional equipment of the expedition with all the requirements for camp, food, extra help, &c. Such impediments were not likely to deter Mr. McClean from roughing it in some lonely spot away from all civilisation. In order to give the reader some idea of the trouble he took in selecting a site and some details of the spot he finally determined upon, the following communication I have received from him will serve this purpose. I may, however, preface this account by stating the names of the members, up to the date of his letter, which formed his party:—F. K. McClean, England; Joseph Brooks, Sydney; J. Worthington, England; H. Winkelmann, Auckland; Allan Young, England; S. G. Dowsett, Auckland; and Ernest Jeffs (steward), Auckland; Arthur Wilson (assistant steward and carpenter), Hobart.

April 4, 1910.

On arriving at Hobart on March 24 I found that Mr. Brooks and Mr. Worthington had already obtained much information about the possible localities for the Eclipse Camp. Mr. Worthington had also examined the east coast to the south of Hobart, and from him I learnt that there was no really good site to be obtained. Later we three made a short excursion south, and found that the whole of the country was mountainous and covered with bush, while, except for the road, which never went far from the sea, there was no possible means of communication. At Dover, on Port Esperance, there was a gap running through these mountains, and from Hope Island in the harbour a fair view could be obtained, giving for some 20° in azimuth a horizon not rising more than 3° above the horizontal. This was a possible place, but owing to the presence of Adamson Peak, 4000 feet high, in the field of view, there was a great probability of clouds even with the rest of the sky clear. We did not visit Bruni Island as the Australian expedition had chosen their site there, and also because the altitude of the sun was only $6\frac{1}{2}°$ at eclipse. Having found that the east coast offered no reasonable site for observation, the south-west coast was next visited. To do this it was necessary to take the train to Launceston and Burnie on the north coast, and the following day travel by Zeehan to Strahan, also by rail. Mr. Hughes, the manager of the Union Steamship Co. at Hobart, had communicated through to arrange for their steamer, the *Wainui*, to call in at Port Davey after leaving Strahan on its way to Hobart, and we were met by Mr. Eva, the local manager of the company, who did everything possible to assist in the arrangement. Accordingly, on the next day we started on the *Wainui* under Captain Livingstone, and early the following morning found ourselves in Port Davey, and were on shore before sunrise.

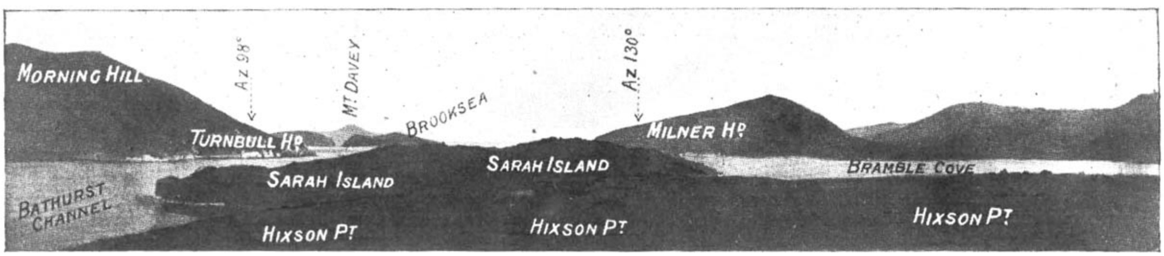

FIG. 1.

We first ascended the hills south of Bathurst Channel to get a general view of the country. In every direction rose hills and mountains from 600 feet to 2000 feet high, and between them were stretches of land-locked water leading out into Port Davey proper and the Southern Ocean. Some of the mountains were masses of almost bare rock, while others looked as though covered with smooth grass, which, however, when traversed, were found to be mostly scrub growth of 1 or 2 feet depth. The more distant mountains and those on the west side of the harbour were heavily timbered. In the valleys were patches of bush and small streams of water, brownish in colour. The place was without population, there being no food except that placed in a refuge for shipwrecked persons, and the country to the back being so mountainous and so thickly wooded that only a few persons have ever broken their way through to the east and north. There are said to be wallaby, wombats, and wolves (Tasmanian devil) in the neighbourhood, and also snakes, but we saw none, and fish are reported to be plentiful. We climbed to the top of Morning Hill and Mount O'Brien, and found that ground overlooking Davey Harbour and a sea horizon across the flat ground by Kelly Basin; but the slope of

the ascent made it impossible of access with instruments, as for part of the way the slope was from 35 to 40 degrees.

From the top it was possible to locate probable sites, and it was seen that there were only two, one at Spain Bay near Hilliard Head, and the other Hixson Point, or Sarah Island, in Bathurst Channel, the latter of which Mr. Brooks and Captain Livingstone were already examining. Spain Bay was open to the full force of the ocean, and was also very shallow, so that Hixson Point alone remained feasible. This on examination was found to answer all requirements. It was only 100 feet high, had deep water close in, and, except for a 6-foot bluff on the shore, had an easy gradient. It was protected from the sea by the Breaksea Islands, and from wind on the south by Morning Hill, and on the north by Mount Misery. There was water within a few hundred yards in a small bay where a camp might be set up, with a small amount of bush cutting. The top was flat for some 200 feet by addition to tents, photographic materials, kitchen and dining utensils, &c. The danger that weather would prevent the steamer calling in made it advisable not to trust to outside assistance. This has kept us very busy, though we have been given every assistance. Mr. Hughes, of the Union Company, has made arrangements for the *Wainui* to drop us and our kit at Port Davey on April 9, and also to call in twice during our stay before it finally will take us away on May 10 or 11 to Melbourne.

Accompanying the above letter were several photographs of the region about Port Davey, with a large scale map of the vicinity. Three of the above photographs, which, when placed together, form a panoramic view looking towards the direction of the eclipsed sun (azimuth 123°), have been reduced, and are illustrated here in Fig. 1. From this the reader

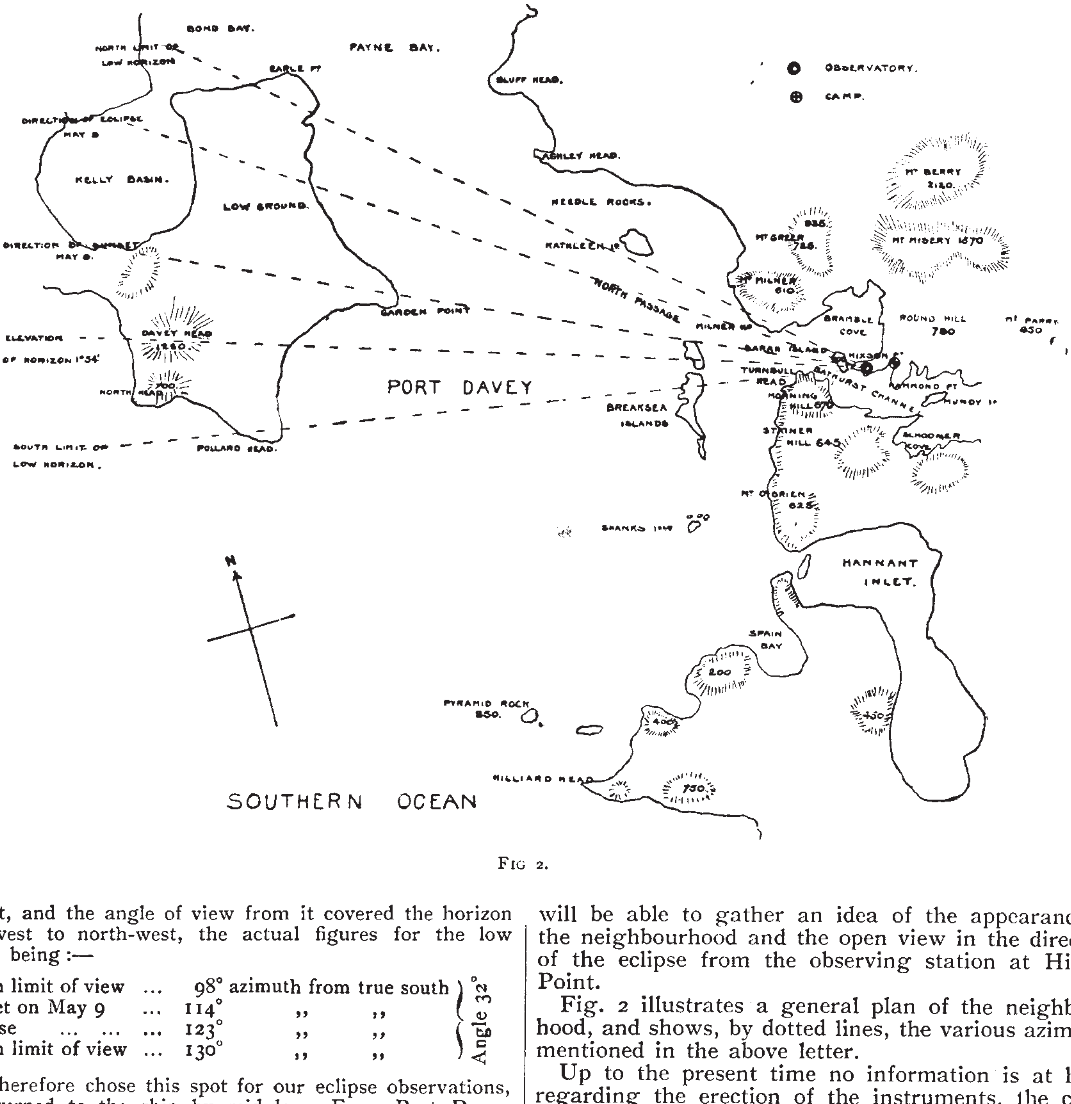

FIG. 2.

100 feet, and the angle of view from it covered the horizon from west to north-west, the actual figures for the low horizon being:—

South limit of view ...	98° azimuth from true south		Angle 32°
Sunset on May 9 ...	114°	,, ,,	
Eclipse	123°	,, ,,	
North limit of view ...	130°	,, ,,	

We therefore chose this spot for our eclipse observations, and returned to the ship by mid-day. From Port Davey we steamed along the south coast, passing through isolated rocks many hundred feet high, and along a coast-line of cliffs, sheer from the water's edge and crowned with trees, offering no possible landing, and of absolutely no use for astronomical observations.

Since there were no supplies at Port Davey we have had to arrange for provisions for the period of stay, in will be able to gather an idea of the appearance of the neighbourhood and the open view in the direction of the eclipse from the observing station at Hixson Point.

Fig. 2 illustrates a general plan of the neighbourhood, and shows, by dotted lines, the various azimuths mentioned in the above letter.

Up to the present time no information is at hand regarding the erection of the instruments, the camp life, and the rehearsals. This will no doubt be received soon, and will form the substance of a later contribution.

In conclusion, it may be mentioned that in the *Westminster Gazette* for May 12, a Reuter cablegram from Melbourne records the observation of the eclipse made at sea on the Oceanic Company's steamer

Corinthic. It reads as follows:—"The eclipse of the sun was witnessed on board the Oceanic Company's steamer *Corinthic,* 480 miles south-west of Hobart. Totality lasted from 2h. 50m. to 2h. 54m. The corona was unexpectedly structureless, being equally distributed round the circumference. There were no prominences, rays, plumes, or streamers. The chromosphere was dark red and of exceptional depth."

WILLIAM J. S. LOCKYER.

SIR WILLIAM HUGGINS, K.C.B., O.M., F.R.S.

ONE of the pioneers of the new era of astronomy opened by the application of the spectroscope and photographic plate to celestial bodies has just passed into silence, and though the memorial formed by his works remains with us, no new block can be added or detail elaborated by the hand of its builder. It is not given to many men of science to have their scientific careers associated so closely with new developments as was that of Sir William Huggins, whose death on May 13, at eighty-six years of age, we regret to record. It may almost be said that he was present at the birth of celestial spectroscopy; when he commenced his work nearly fifty years ago, he had a virgin field of study before him, so that "nearly every observation revealed a new fact, and almost every night's work was red-lettered by some discovery." It was inevitable that some lines laid down in this early survey required modification as more exact instruments and methods became available, but the observations served their purpose in showing that new regions awaited exploration, and Sir William Huggins lived to lead investigators into the realm thus gained for science, and to stimulate a new generation to study it in detail.

In 1901, a year after Sir William Huggins had been elected president of the Royal Society, an appreciative account of his work was given by Prof. Kayser in these columns as a contribution to our series of "Scientific Worthies." He was then seventy-seven years of age, and had crowned the edifice of his scientific publications by the production of a sumptuous "Atlas of Representative Stellar Spectra." In 1902 his achievements received the highest official recognition by the bestowal upon him of the Order of Merit. While president of the Royal Society from 1900 to 1905, he delivered four addresses in the course of which he described some of the work which the society has done, and is doing, for the nation. Selections from these addresses, with a short history of the Royal Society, were published in volume form in 1906, and the subjects with which they deal were thus brought under the attention of a wider public than that present at the anniversary meetings at which they were delivered. Two of the addresses were concerned mainly with scientific education, and the public interest excited by one of them led the Royal Society to appoint a committee to consider the subject and prepare a report, which was afterwards sent to the existing universities of the United Kingdom, with a resolution adopted by the president and council asking that steps be taken to "ensure that a knowledge of science is recognised in schools and elsewhere as an essential part of general education." It is a matter for regret that this manifesto, which was a sequel to Sir William Huggins's advocacy of the claims of science in modern life, led to no definite result. A fuller knowledge of the conditions at the public schools and universities, and greater precision in the recommendations of the committee, might have gained for him a place among educational reformers who see their causes triumphant.

There is no need now to refer in much detail to Sir William Huggins's activities in the domain of astrophysics, for his work was surveyed in the "Scientific Worthies" article mentioned already. He began his spectroscopic studies with Prof. W. A. Miller in 1864, by the examination of the spectra of a few stars, with particular reference to the identification of their chemical constituents. Nine or ten terrestrial elements were found to exist in the atmospheres of Betelgeuse and Aldebaran, and other elements were suspected. While carrying on these investigations, he submitted a planetary nebula in Draco, close to the pole of the ecliptic, to a spectroscopic examination, and found the spectrum to consist of three bright lines, the brightest of which—the characteristic nebular line—he believed to be coincident with a line due to nitrogen. This identification was afterwards disproved, but there remains to his credit the fact that he was the first to observe the bright-line radiation of some nebulæ.

Sir William Huggins was also the first to apply the Doppler-Fizeau principle to the measurement of radial velocities. He showed in 1867 that motion in the line of sight could be determined by measuring the displacement of spectrum lines in a star or other heavenly body; but though his work, and that to which it gave rise at the Royal Observatory, Greenwich, demonstrated the feasibility of the method, the results were too discordant to be of substantial service to science. Not until Vogel applied photography to the subject, about twenty years later, was real success achieved, and the value of the principle in astrophysical investigations realised.

Photography had been used by Sir William Huggins in cooperation with spectroscopy long before Vogel showed the precision with which radial velocities could be determined by its aid. He was probably the first to obtain a spectrograph of Sirius, in 1863, using a wet plate, though he failed to secure any impressions of lines in the record. After the invention of the gelatin dry plate, several years later, the attempt to secure photographs of stellar spectra was renewed, and success was attained. Using instruments placed at his disposal by the Royal Society, he photographed the ultra-violet series of hydrogen lines in the spectra of six "white stars," this being the first time the series had been revealed, either in terrestrial or celestial chemistry. It is a little surprising, therefore, that he did not anticipate Vogel in the application of photography to the determinations of radial velocities which have led to such valuable additions to our knowledge of binary systems and the gregarious movements of stars.

Not so much is known, perhaps, of Sir William Huggins's work in other astronomical directions as of that in celestial spectroscopy. With Prof. Stone, about 1870, he made some investigations with the object of measuring the heat received from stars, using a thermopile, and concluded that distinct indications of thermal effects due to stellar radiations were obtained; but the results are now known not to be trustworthy. Twenty years later, Prof. Boys, using his far more sensitive radiometer, was unable to find any definite effects from the brightest stars, and only when a more delicate radiometer was used by Prof. Nichols in conjunction with the great telescope at the Yerkes Observatory was it possible to secure distinct deflections due to radiation from stars like Vega and Arcturus.

Such revision as this of early observations is, we take it, a concomitant of scientific progress. However well an investigator may build, the iconoclast, with superior equipment and deeper knowledge of causes of weakness of conclusions, overthrows the edifice and erects his own pillar in its place. There